Space Weather Forecast

Issued on Sunday, 11 February 2024 at 13:40 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Current Minor Solar Radiation Storm gradually declining. Further Minor/Moderate Radio Blackouts likely, with slight chance of Strong. Chance of G1/G2 conditions day 2 (12 Feb), likely day 3 (13 Feb).

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Solar activity has been Moderate over the past 24 hours, with a high-level Moderate-class flare observed at 10/2307UTC, originating from the large and magnetically complex sunspot region located in the southwest quadrant, near centre-disc. There are currently seven regions on the visible disc. The aforementioned large sunspot in the southwest near centre-disc is the most magnetically complex, but has shown signs of fading and simplification in recent hours. All other spots are relatively simple and unremarkable.

The highlevel Moderate flare produced a CME (coronal mass ejection) which preliminary modelling suggests will arrive around the middle of day 3 (13 Feb). Two further CMEs from this morning await further analysis..

Solar Wind / Geomagnetic Activity: Solar winds were at slow-ambient levels at first, with density around average or below. The IMF was weak at first, with the north-south component varying weakly.

A sudden increase in solar wind speed was observed around 11/0120UTC, to slightly elevated levels around 450km/s, gradually increasing further in recent hours to elevated levels around 550km/s. Density increased steadily to above average from around 10/2330UTC, with a sudden increase apparent at the same time as the speed increase around 11/0120UTC. The IMF (Bt) became strong at the same time, with the north-south component (Bz) varying strongly. This is thought to be due to arrival of a CME, likely a glancing shock from the Strong-class flare on 09 Feb.

Geomagnetic activity was Quiet (Kp0-2) at first, but Active (Kp3) and Unsettled (Kp4) intervals have been observed since the sudden impact.

Energetic Particles / Solar Radiation: Solar radiation levels remains above S1 Minor Storm levels (10pfu) and shows a declining trend.

Four-Day Space Weather Forecast Summary

Solar Activity: Moderate X-ray flare activity likely, and a slight chance of further Strong-class activity mostly from the very large region near centre disc.

Solar Wind / Geomagnetic Activity: Multiple CME arrivals are possible over the coming days, particularly from late day 2 (12 Feb) and through day 3 (13 Feb), which may enhance the solar wind environment.

Quiet to Unsettled conditions are expected to start the four-day period. Chance of G1/G2 from late on day 2 (12 Feb) becoming likely into day 3 (13 Feb) due to multiple CME arrivals, with an outside chance of a G3. Lingering CME effects are possible by day 4 (14 Feb), though overall geomagnetic activity should fall back to Quiet to Unsettled, pending analysis of more recent

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CMEs.

Energetic Particles / Solar Radiation: Solar radiation levels should begin to subside through the period, though likely remaining above S1 through day 1 (11 Feb), with a gradual fall to below S1 levels possibly by late day 2 (12 Feb).

Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	10	50	60	10
Strong	G3	No	1	5	2	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	70	70	70	70
Very Active	R3 to R5 X	No	20	20	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	Yes	99	80	40	30
Very Active	≥ S3 *	No	10	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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